

# Composite Conducting Polymer Cathodes For High Energy Density Lithium-Ion Batteries, Phase I

Completed Technology Project (2007 - 2007)



## Project Introduction

Future NASA planetary exploration missions require secondary (rechargeable) batteries that can operate at extreme temperatures (-60

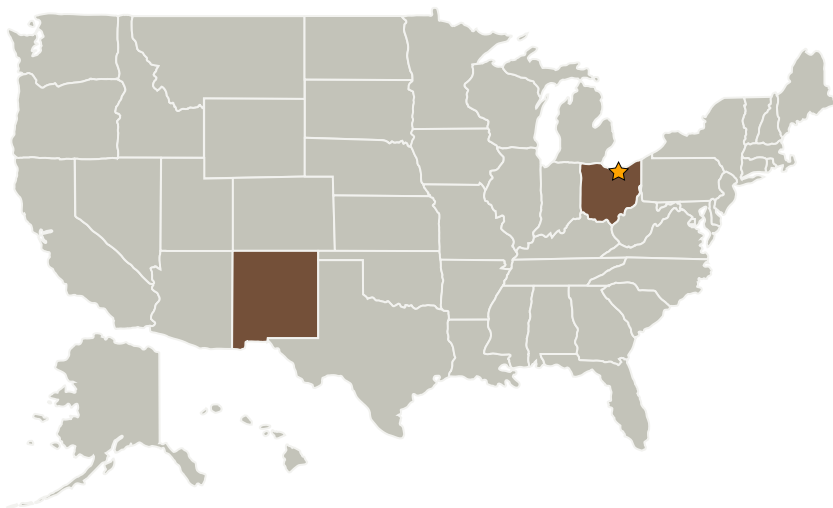
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C) yet deliver high specific energies (> 180 W·hr/kg) and long cycle life (>2,000 cycles). Functional organic materials are a promising technology for use as the cathode in Li-Ion batteries due to their high specific energy density. It is also expected that the use of polymeric cathodes instead of lithium metal oxides will make Li-Ion batteries thinner, lighter and less environmentally hazardous. This Phase I proposal is based on demonstrating the feasibility of fully packaged Li-Ion batteries that have a superior specific energy (>200 W·hr/kg) through the use of novel polymeric cathodes (composite conducting polymer/disulfide materials) when coupled with room temperature ionic liquid (RTIL) electrolyte. Compared to traditional organic electrolyte systems (e.g. (e.g. lithium salts dissolved in alkyl carbonates), RTIL electrolytes have favorable electrochemical windows (> 5 V) and high ionic conductivity over a wide range of temperatures from -60°C to 250°C and are known to prolong the lifetime of conducting polymer electrochemical devices. Besides these highly desirable characteristics for use in these novel Li-ion batteries, RTILs have inherent safety characteristics by virtue of their thermal stability, non-flammability, non-volatility and low heat of reaction with active materials.

## Primary U.S. Work Locations and Key Partners



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## Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Organizational Responsibility	1
Project Management	2
Technology Areas	2

## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Center / Facility:

Glenn Research Center (GRC)

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
Santa Fe Science and Technology, Inc.	Supporting Organization	Industry	Santa Fe, New Mexico

## Primary U.S. Work Locations

New Mexico	Ohio
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## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

## Technology Areas

**Primary:**

- TX03 Aerospace Power and Energy Storage
  - └ TX03.2 Energy Storage
    - └ TX03.2.1 Electrochemical: Batteries